

*Re: B5*  
pressing the optical fiber against said wiring substrate with a predetermined pressure; and  
moving said wiring head along said wiring pattern with respect to said wiring substrate to thereby conduct said wiring.

**REMARKS**

The Office Action dated December 18, 2001, has been carefully considered. In response to the Office Action, Applicants have amended the application. Applicants request that the Examiner consider the following remarks, and then pass the application to allowance.

**Changes in the Specification:**

The specification has been amended to correct a minor typographical error in accordance with the Examiner's suggestion, which is gratefully acknowledged.

**Pending Claims:**

Claims 1-25 are pending.

**Art Rejection Under 35 U.S.C. § 102(b):**

Claims 1-4, 6, 9, 12, 13, 17, and 22-25 were rejected under 35 U.S.C. § 102(b) as anticipated by Holland (U.S. Pat. No. 5,421,930).

Claim 1 has been amended to recite

. . . a wiring head which guides an optical fiber to a lead end thereof along a guide groove through which the optical fiber slides into position on the substrate, the guide groove extending partially along a length of the wiring head and forming an optical fiber path. . .

Claims 22-25 have been amended to recite that the wiring head is wheel-less. By comparison, Holland discloses a wiring head using a rotatable wiring or routing wheel (17). The fiber in Holland, unlike in Claim 1, does not *slide* through a guide groove, as the circumferentially-formed groove of Holland's wheel 17 rotates with the advancing fiber. Moreover, the groove in Holland's wheel 17 does not extend "*partially* along a length of the wiring head," (emphasis added), but rather extends the full circumference of the wheel 17.

By using a wiring or routing wheel, Holland encounters the full range of problems discussed in the Background section of applicant's written description, which problems are particularly acute for example where portions of the wiring pattern are curved as the precision of the curving pattern cannot be improved due to limitations in the miniaturization of the rotatable wheel, or where overlapping wiring is to be implemented.

**Art Rejection Under 35 U.S.C. § 103(a):**

Claims 10 and 14 were rejected under 35 U.S.C. § 103(a) as unpatentable over Holland. As discussed above, Holland fails to disclose the arrangement of base Claim 1. This is arrangement not obvious as the Holland device is directed to routing methods and apparatus which employ a routing wheel, whereas the invention of base Claim 1 and dependent Claims 10 and 14 is directed to a wheel-less arrangement.

Claims 15 and 16 were rejected under 35 U.S.C. § 103(a) as unpatentable over Holland in view of Brown, et al.. However, Brown, et al. fails to remedy the aforementioned shortcomings of Holland in teaching or suggesting the presently claimed invention.

Claims 19 and 21 were rejected under 35 U.S.C. § 103(a) as unpatentable over Brown, et al.. Claims 19 states that the "wiring mechanism includes an optical fiber pressing means for pressing said optical fiber against said wiring substrate with a predetermined pressure." Claim 21 recites a similar limitation. Brown, et al. does not teach this limitation of applying a predetermined pressure, which pressure, according to the written description, permits the wiring for straight as well as curved paths, and is adjusted accordingly.

**Conclusion:**

In view of the preceding discussion, Applicants respectfully urge that the claims of the present application define patentable subject matter and should be passed to allowance.

Such allowance is respectfully solicited.

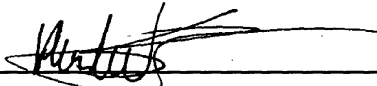
If the Examiner believes that a telephone call would help advance prosecution of the present invention, the Examiner is kindly invited to call the undersigned attorney,

Mr. Khaled Shami, at (650) 622-2332.

Respectfully submitted,

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**Marked-Up Copy of Changes**

**In the Specification**

*The second complete paragraph on page 23 has been amended as follows:*

The structure of the main parts of the optical fiber wiring apparatus (100) are shown in Figure 3. Figure 3 is a front view showing the vicinity of the carriage (310). Here, as described above, the upper structure of the manipulator (300) (the structure provided by frame 1 (120) and frames 2 (130) is affixed to a feed mechanism connection part (321) which is attached above the support member (320) of the carriage (310) via the Z axis shaft (620). As shown in Figure 3, this feed mechanism connection part (321) has formed therein an optical fiber insertion hole [(320)] 322 for guiding the optical fiber (700) sent from the upper structure (not depicted in Figure 3) in the downward direction.

**In the Claims:**

*Claims 1, 3, 10, 19-24 have been amended as follows:*

1. (Amended) An optical fiber wiring apparatus for wiring a substrate, comprising  
[, wherein are provided]:

[a wiring substrate on which optical fibers are wired;]

a wheel-less wiring head which guides an optical fiber to a lead end thereof along a  
guide groove through which the optical fiber slides into position on the substrate, the guide

groove extending partially along a length of the wiring head and forming [and forms] an  
optical fiber path;

an optical fiber feed means which feeds said optical fiber during the wiring operation into said optical fiber path of said wiring head;

an optical fiber [contact] contacting means, which brings an optical fiber, which has been guided to said lead end of said wiring head via said optical fiber path, and said wiring substrate into contact, wherein the optical fiber contacting means includes an optical fiber pressing means for pressing said optical fiber against said wiring substrate with a predetermined pressure;

an XY movement means, which moves said wiring substrate and said wiring head relative to one another in the X and Y directions in the state in which said optical fiber at said lead end of said wiring head has been placed in contact with said wiring substrate by said optical fiber [contact] contacting means; and

an optical fiber affixing means, which successively affixes, to said wiring substrate, said optical fiber which has been brought into contact with said wiring substrate during movement by said XY movement means.

3. (Amended) An optical fiber wiring apparatus in accordance with claim 1,  
wherein

at least a lead end of said wiring head has a hemispherical shape and [a] the guide groove which guides said optical fiber in the hemispherical part,

a pressure groove is formed which is connected to said guide groove and extends to said hemispherical part, and

said optical fiber is guided to the lead end of said wiring head via said guide groove and said pressure groove.

10. (Amended) An optical fiber wiring apparatus in accordance with claim 9, wherein

[a force] the predetermined pressure with which said optical fiber [contacting] pressing means [brings said wiring substrate and] presses said optical fiber at a lead end of said wiring head [into contact] against said wiring substrate is within a range of  $9.8 \times 10^{-2}$  (N) (10 gf) - 2.0 N (200 gf).

19. (Amended) An optical fiber wiring apparatus which lays optical fibers down on a wiring substrate, comprising:

[which is provided with] a manipulator which is disposed in a plane which is approximately parallel to the surface of said wiring substrate in a movable manner, and which conducts the laying operation of the optical fibers on said wiring substrate, [and

which] the manipulator comprising [is further provided with]:

an optical fiber feed means for feeding an optical fiber[s,];

a wheel-less wiring mechanism for wiring, onto said wiring substrate, said optical fiber[s] fed by said optical fiber feed means, wherein the wiring mechanism includes an optical fiber pressing means for pressing said optical fiber against said wiring substrate with a predetermined pressure;

a Z axial rotation mechanism which rotates about an axis approximately perpendicular to the surface of said wiring substrate and thereby changes the orientation of the wiring of said wiring mechanism; and

an optical fiber cutting means which cuts optical fiber fed by said optical fiber feed means.

20. (Amended)        An optical fiber wiring apparatus in accordance with claim 19, wherein

said wiring [means] mechanism is disposed so as to be movable in a direction of approach to or separation from said wiring substrate, and said wiring mechanism includes a wiring plunger [is provided] which presses said optical fiber against said wiring substrate by using said optical fiber pressing means while guiding said optical fiber in a predetermined orientation, and



said optical fiber feed means and said wiring plunger are disposed so as to hold said optical fiber cutting means therebetween in the Z axial direction, and are disposed so as to be simultaneously rotatable by said Z axial rotation means.

21. (Amended) A wiring method which conducts the wiring of an optical fiber onto a wiring substrate, [wherein] comprising:

adjusting the feeding of [this] the optical fiber [is adjusted] by an optical fiber feed means so that the tension on the optical fiber is within a fixed range[.];

wiring the optical fiber fed by the optical fiber feed means [is wired] onto the wiring substrate by a wheel-less wiring [means,] mechanism while the optical fiber is guided along a guide groove formed in the wiring mechanism and is pressed against the wiring substrate with a predetermined pressure; and

cutting the optical fiber [is cut] to [the length] a required length for the wiring by an optical fiber cutting means.

22. (Amended) An optical fiber wiring method which employs an optical fiber wiring apparatus which is provided with a wiring substrate, a wheel-less wiring head which has a guide groove along which an optical fiber is guided, and applies an the optical fiber to said wiring substrate with a predetermined [force] pressure, and an optical fiber feed means which feeds stocked optical fiber, which apparatus moves said wiring substrate and said

wiring head relative to one another in the XY directions and conducts wiring operations which form a desired optical fiber wiring pattern on said wiring substrate[; wherein] .  
comprising:

feeding an optical fiber of predetermined length [is fed] by said optical fiber feeding means, in a manner unrelated to the wiring, either before or after the wiring operation or both before and after the wiring operation, and thereby producing an optical wiring board having optical fibers of a predetermined length connected to said wiring pattern either before or after said wiring pattern by means of the wiring operation or both before and after said wiring pattern[, is produced].

23. (Amended) An optical fiber wiring method which employs an optical fiber wiring apparatus which is provided with a wiring substrate, a wheel-less wiring head which is provided with an optical fiber path which guides an optical fiber to a lead end thereof and which applies said optical fiber guided to said lead end to said wiring substrate with a predetermined [force] pressure, and an optical fiber feeding means which feeds stocked optical fiber, which apparatus moves said wiring substrate and said wiring head relative to one another in the XY directions and conducts a wiring operation which forms a predetermined optical fiber wiring pattern on said wiring substrate[; wherein], comprising:

at the initiation of wiring, moving said wiring head [is moved] to a wiring initiation position, and

in the state in which said optical fiber has been guided to said lead end of said wiring head along a guide groove formed in the wiring head, [this] pressing said optical fiber [is pressed] against said wiring substrate with said predetermined pressure,

said wiring head is moved along said wiring pattern with respect to said wiring substrate, the required optical fiber is fed into said optical fiber path of said wiring head by said optical fiber feeding means, and wiring is conducted.

24. (Amended) An optical fiber wiring method in which an optical fiber is laid on a wiring substrate by a wheel-less wiring head, at least a lead end of which is formed with a spherical surface, which has formed in a side surface part thereof a guide groove which guides an optical fiber to said spherical surface part, and which has a pressure groove which extends from said guide groove to the top part of said spherical surface part[; wherein], comprising:

at the initiation of wiring, moving said wiring head [is moved] to a wiring initiation position[,];

fitting an optical fiber [is fitted] into said pressure groove; [and is pressed]

pressing the optical fiber against said wiring substrate with a predetermined pressure [,] ; and

moving said wiring head [is moved] along said wiring pattern with respect to said wiring substrate[, and] to thereby conduct said wiring [is conducted].